THE FLEXIBILITY OF ETHER VAPOR ANESTHESIA*

By LORRULI A. RETHWILM

A number of articles have been written about vapor anesthesia since Junker, in 1867, first blew air through chloroform and Clover, in 187/, vaporized ether. Some of these recommended its use intratracheally; others extolled some different machine, for many forms of apparatus have been invented. I am going to make a plea, however, for the more frequent use of ether as vapor.

It is now generally accepted that ether vapor is the anesthetic of choice for the anesthesia for tonsillectomy and all work about the face or neck, but its value for other cases, as for instance gall-bladder work, has not as yet been fully appreciated.

One of the advantages claimed for it is smooth induction. We find a nitrous oxid-oxygen ether sequence even more rapid and more pleasant to the patient and use this form of induction even in children. In babies a few days or weeks old we usually begin with the vapor, together with ether dropped on the vapor-mask.

The vapor we give is sometimes ether with air, and at times ether with oxygen, or we may pass both air and oxygen through ether at the same time. We consider the vapor formed in this way less irritating than that produced by dropping ether on a heated surface to vaporize it, and letting that pass to the patient.

The method of administration depends entirely on the case. We may pass a catheter into the pharynx through the nose, or occasionally through the mouth; we frequently use a vapor-mask covering mouth and nose, and at times insert a mouth hook, at the same time using a wire airway. These are our usual methods of administration. We do not use a closed method, but prefer the semi-open, though I admit it uses more ether than the closed.

Six thousand four hundred and nine anesthesias were given at Stanford Hospital in two years, starting June 1, 1921. Excluding 1698 of these, as they were nitrous oxid-oxygen and some spinal anesthesias, of the remaining, 2831 were vapor anesthesias, 1685 of these were tonsil cases or combination tonsillectomy or tooth extractions. The remaining 1136 cases of vapor anesthesia I have roughly classified into groups as follows: Oesophagoscopy and bronchoscopy, 28; dental cases, 96; other nose and throat work, 108; mastoid operations, 112; eye operations, 97; mouth, jaw, or tongue operations, 60; cleft palate and harelip, 20; thyroidectomies, 33; brain cases, 33; Hibbs, Albee, and laminectomies, 22; gall-bladder cases, 31; gastroenterostomies, 8; exploratory laparotomy and abdominal work, 34; laparotomy and minor operations, 138; appendectomies, 41; hernias, 37; proloric stenosis in infants, 6; rectal cases (mostly Kraskies), 12; kidney and ureter operations, 20; other genito-urinary operations, 36; breast amputations, 19; pilonidal cyst, 2; miscellaneous, 153.

We do not let internes use vapor on clinic cases, even though supervised, until they understand the drop method and the condition of their patients. We always caution them that patients can very readily be put too deeply asleep with vapor, and that they must watch them carefully. The margin of safety is much greater when oxygen is used. Still, we hear of deaths from ether vapor anesthesias occurring from time to time—mostly not published—and these could be avoided if articles extolling the values of ether vapor would mention its danger. One more point is that, when vapor was first used, the machines were at times put together wrong and liquid ether would flow to the patient and cause death. We avoid the possibility of this by inserting a Murphy drip-bulb, without a hole, in the tubing that passes from the machine to the patient. With these two cautions, I can pass on to the many advantages of ether vapor.

I cannot write of ether vapor anesthesia without writing of oxygen-ether vapor, as we use oxygen for most of our cases. We do not heat our ether, nor do we blow air through it so rapidly that ice collects on the bottle. The air may be passed through two bottles of ether if necessary to have a strong vapor. We agree with Cable that ether vapor given to the patient at the end of a three and a half foot hose is usually at least within a degree of room temperature. Even a somewhat shorter hose will give the same, according to our tests.

One of the greatest advantages of ether vapor is that, if the breathing is shallow or depressed for any reason whatsoever (patient nervous or as found in some gall-bladder cases) and is not of sufficient warmth or depth to vaporize the ether dropped on a mask, this vapor given ready to inhale will reach the patient's lungs and put him to sleep without delay, and good relaxation is obtained in a very short time.

Although for most operations the patient is satisfactorily relaxed with ether vapor when his eyes are still rolling, deeper relaxation can be obtained in a few breaths by giving stronger vapor. This we do when the abdomen is being explored, when traction is made on the gall-bladder if the surgeon insists on profound relaxation, or at any time if for any reason the patient must be more relaxed. As soon as the manipulation or other cause for profound relaxation has passed over the quantity or strength of vapor is immediately reduced. This flexibility is especially valuable when, for instance, a surgeon unexpectedly decides to feel the gall-bladder at a time when the patient is lightly anesthetized.

During the entire course of the anesthesia there is an even maintenance—just the depth is varied—which can be done either by decreasing the rate of flow of the air or oxygen through the ether, or by cutting out one bottle of ether, or by having only part of the oxygen bubble through the ether. One of the chief reasons for the flexibility lies in the fact that the vaporized ether is ready for inhalation (and as I have mentioned, the patient will get it into his lungs even if he takes only small, shallow breaths). This is true provided there is an open airway, which must always be maintained not only for the smoothness of the anesthesia itself, but to

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prevent a high tension of carbon dioxid in the alveoli, which raises blood pressure. Moreover, laboring to breathe adds an extra strain to the patient.

This open airway can be secured in any number of ways, depending on the nature and site of the operation. In many patients nothing is necessary; some require a wire or other airway in their mouth to breathe freely. Again, a catheter may be inserted in each nostril to the pharynx—one catheter for the anesthetic, the other one for the patient to exhale through or for use with suction. We have never found it necessary to use intratracheal insufflation in any of our work, and in our use of vapor find all the advantages claimed for it without some of its disadvantages. In fact, intratracheal is being used less and less everywhere.

We keep all of our patients anesthetized as lightly as is consistent with the work that is being done. When giving drop-ether we have repeatedly been able to regulate the amount so nicely that the patient was awake on leaving the operating-room. However, with ether vapor, especially when given with oxygen, the patient receives less ether, is maintained asleep more evenly, and can be put more deeply and lightly under with more readiness than with any other method.

Because of the small amount of ether given, and because we prefer to keep the patient very lightly asleep at the close, we do not wash the stomach as a rule. In gall-bladder cases or in patients that have had fecal or other vomiting, we do wash the stomach.

In all cases where the stomach is not washed, the patient can be nearly awake at the close—how much so depends more on the surgeon and the nature of the operation than on the patient or the anesthetist.

It is known to any anesthetist that some patients require more anesthetic than others to relax them. Even the same patient may take more at one operation than at another, even for the same kind of surgical work, and naturally requires more during some procedures than during others, even at the same operation. We find ether vapor quickly and smoothly covers all these conditions, and a patient can be put sufficiently deep with a few breaths of ether vapor where several times as many breaths of drop-ether would be required.

The flexibility of the anesthetic is especially desired by those doctors who have the patients welfare enough in mind that they want to keep them anesthetized as lightly as possible. Of course, if a surgeon cares only to have his patient absolutely relaxed throughout, vapor anesthesia would fill that requirement, too, but that is not why it is recommended.

There are a few serious heart cases that have really had a form of vapor anesthesia, though not listed as such. We have found that some myocardial degenerations, and others that were really bad risks, do perhaps best of all on a nitrous oxid-oxygen anesthesia with about 30 to 50 per cent oxygen, never giving less than 25 per cent, and adding a small amount of ether vapor from the attached ether container.

In conclusion, I must say that many advantages originally claimed for intratracheal and other vapor methods, are now found in almost any good skilful administration of anesthetics. These are, for instance, absence of delirium at start and finish, practical freedom from mucus, very little vomiting, and a much better condition of the patient at the close.

Ether vapor, especially when given with oxygen, surpasses other forms of ether administration in giving: (1) Even maintenance; (2) perfect relaxation with less ether; (3) proper oxygenation with less demand on the muscles of respiration and on the circulation than other methods.

Wound up with, and at the bottom of these advantages, is the perfect flexibility of this form of ether, whereby the level of anesthesia can be readily and smoothly changed at any time.

THE TREATMENT OF KELOIDS WITH RADIUM*

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In the minds of the majority of laymen and also many medical men, radium therapy is adapted only to neoplasms. This is far from true. There are quite a number of non-malignant conditions that are not only amenable to the rays of radium, but in which radium is the treatment of choice. One of the outstanding members of this group of benign conditions is keloid.

These stubborn new growths occur following some trauma and if excised almost invariably recur, usually in a worse form than before. Various forms of treatment have been tried. Surgery is sometimes successful, but only when the excision has been exceedingly wide, at least as radical as for a very malignant neoplasm. Surgery, either preceded by or followed by radiotherapy, either with the X-ray or radium, is frequently successful and is the method of choice in certain very extensive keloids. In certain cases X-ray alone is indicated. Properly applied, the X-rays are often capable of producing good results, particularly in recently acquired lesions. Recently some investigators in Germany have reported good results by the digestion of these growths with pepsin.

A keloid is essentially a hypertrophic scar. In some instances it is difficult to differentiate between a simple scar and keloid. Usually a lesion is classified as a keloid which is raised, shiny, hard, and pink to waxy in color which has developed following some sort of abrasion. There are frequently root-like extensions fading into the normal skin, but this is not always true. The cause of keloid formation is not known. People vary greatly in their susceptibility to them. Some develop keloid following any type of abrasion. It is the impression of most dermatologists that they develop most readily in negroes and other dark-skinned races, though they are seen in fair-skinned persons. Sometimes a patient will develop keloid following an apparently insignificant injury, without a history

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